FIG.1

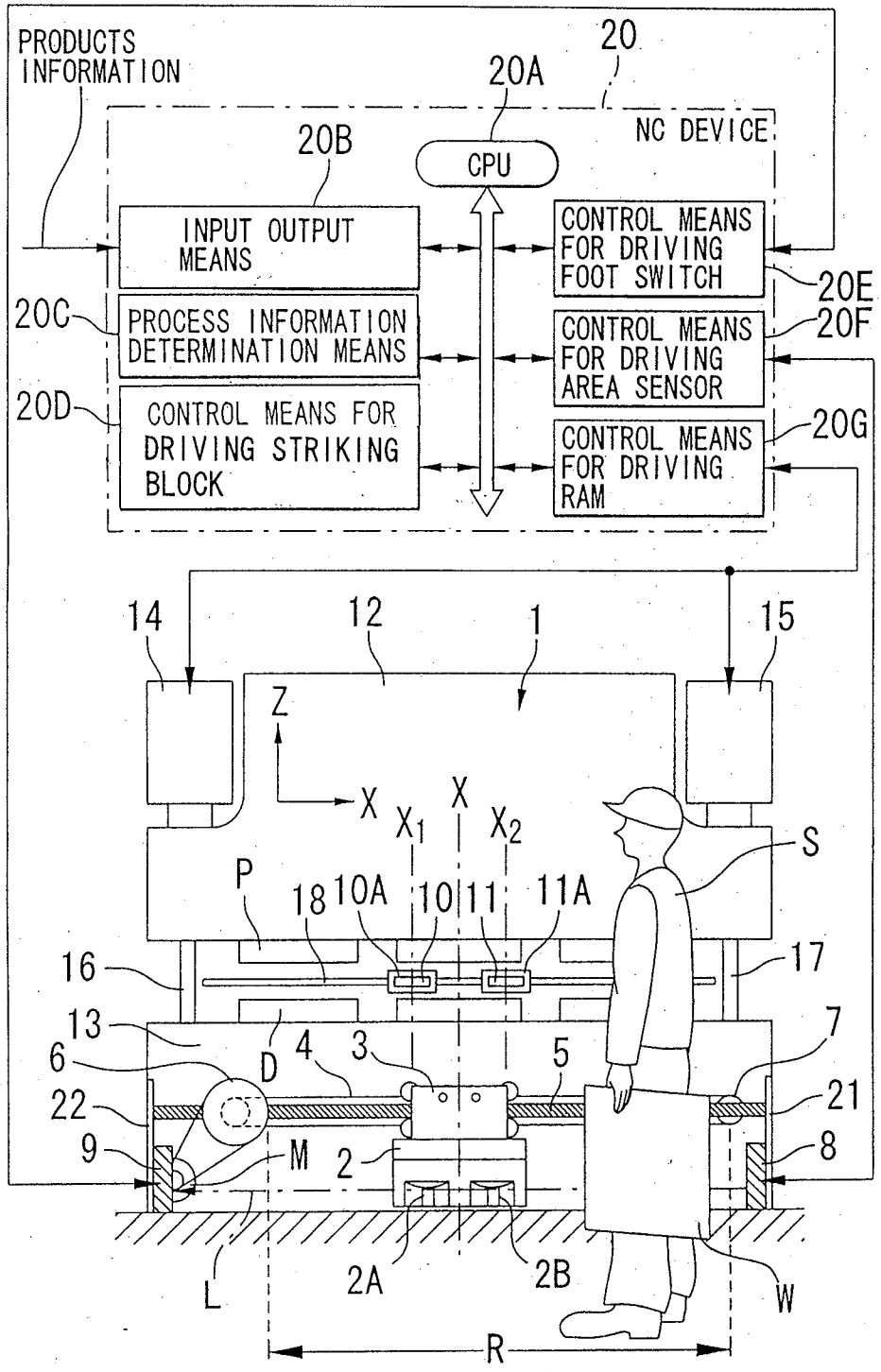

PRODUCTS INFORMATION
20
20A
NC DEVICE
20B
CPU
INPUT OUTPUT MEANS
CONTROL MEANS FOR DRIVING FOOT SWITCH
20E
20C
PROCESS INFORMATION DETERMINATION MEANS
CONTROL MEANS FOR DRIVING AREA SENSOR
20F
20D
CONTROL MEANS FOR DRIVING STRIKING BLOCK
CONTROL MEANS FOR DRIVING RAM
20G
14
12
1
15
Z
X
X
X1
X2
S
P
18
10A
10
11
11A
16
17
13
7
6
D
4
3
5
22
21
9
M
2
8
2A
2B
L
W
R

FIG.2

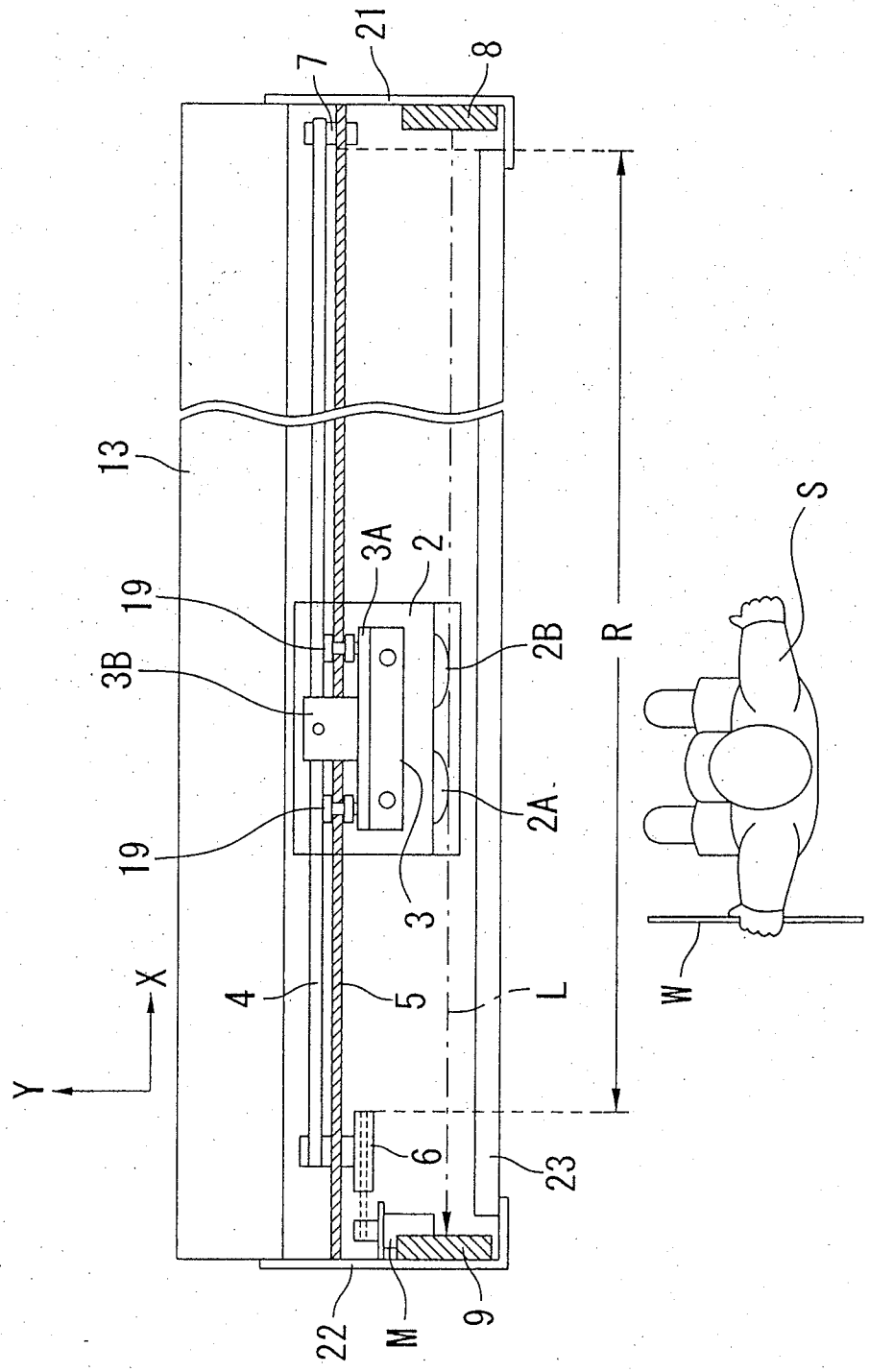


FIG.3

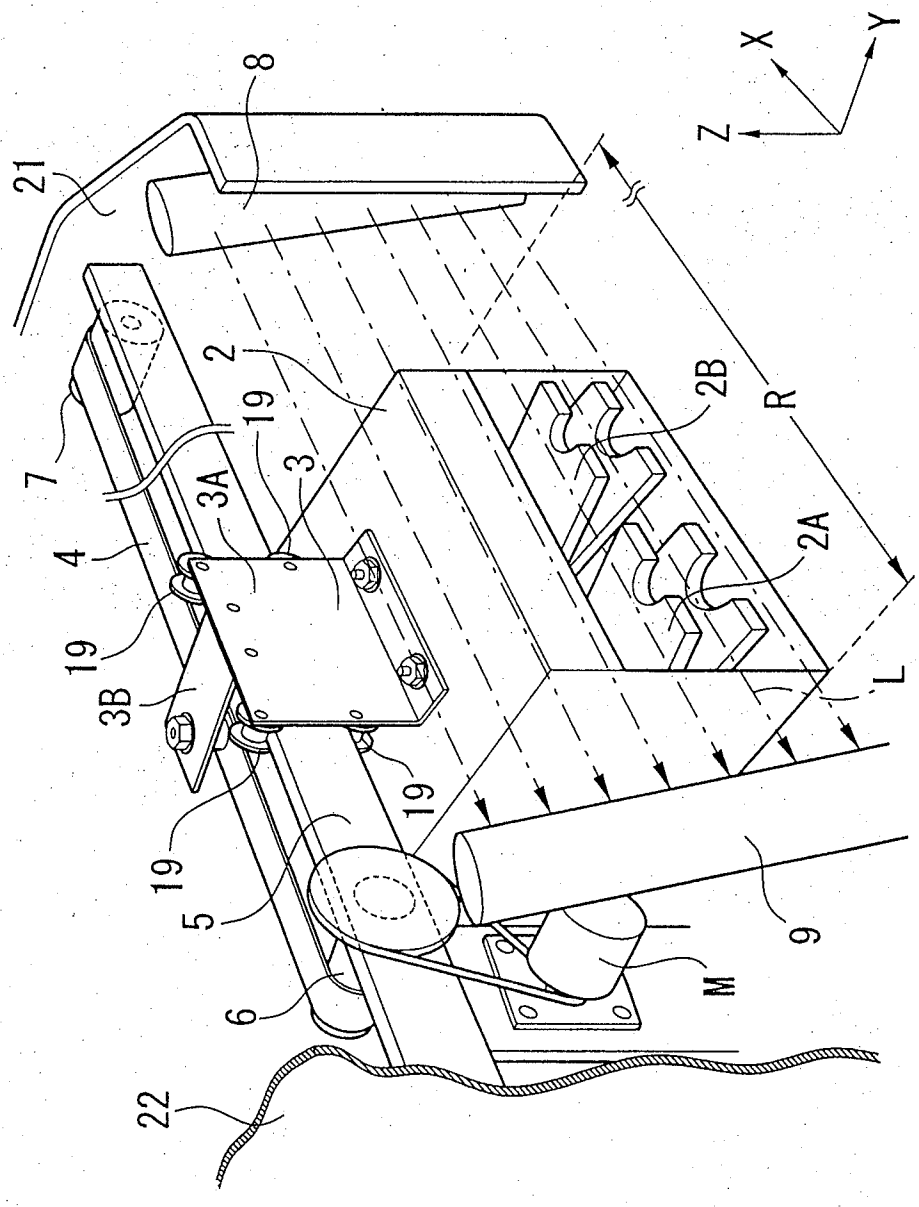


FIG.4

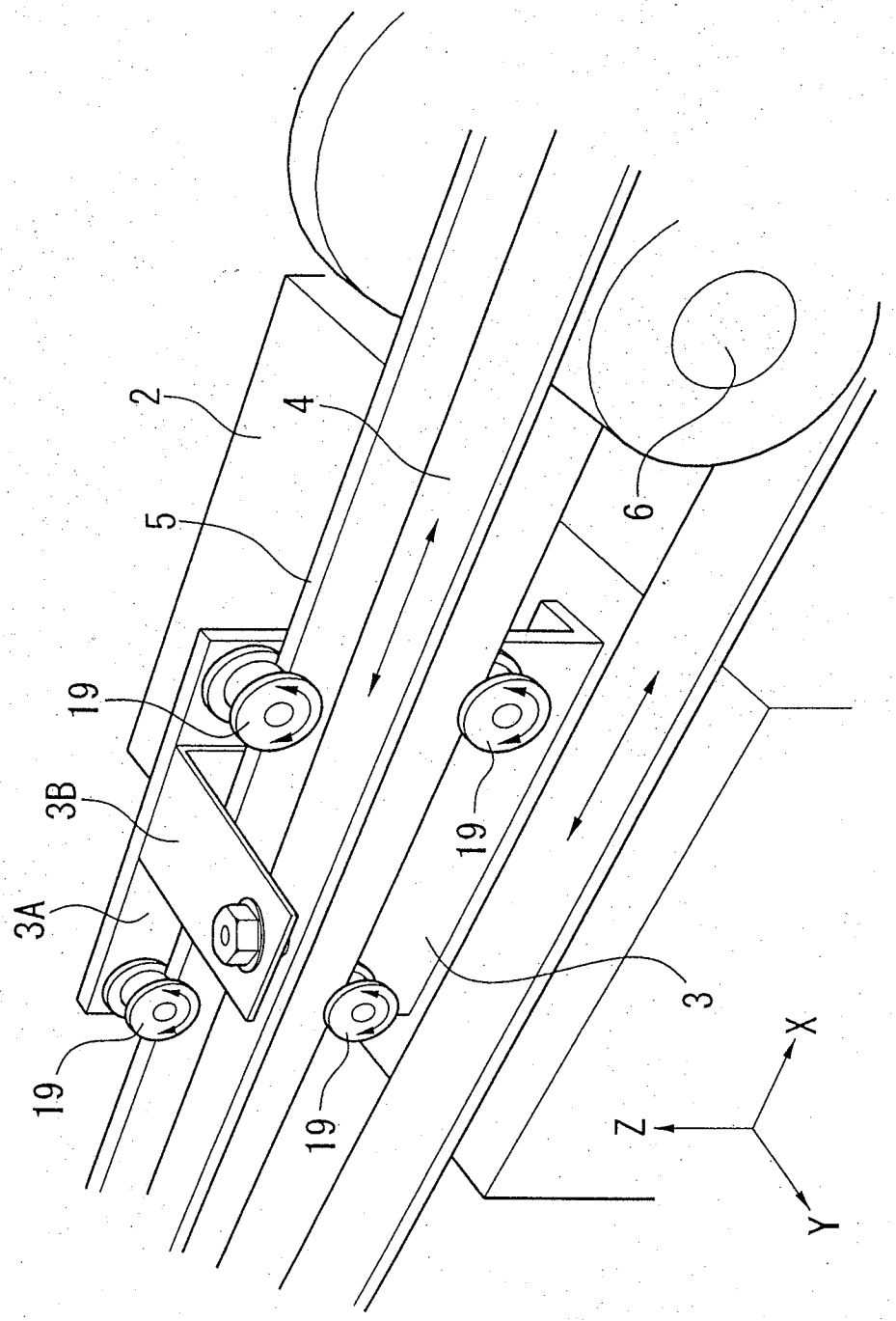


FIG.5

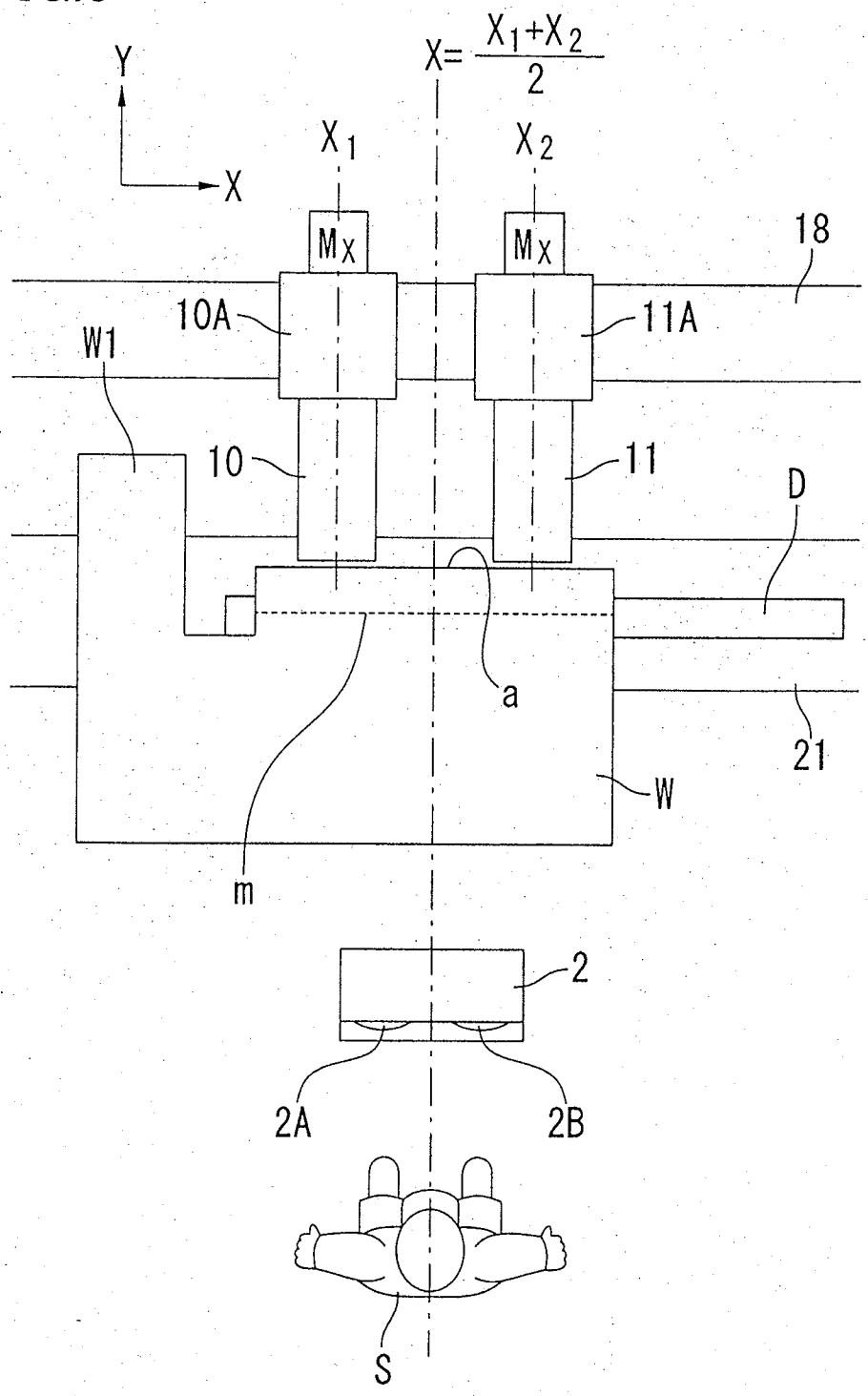


FIG.6

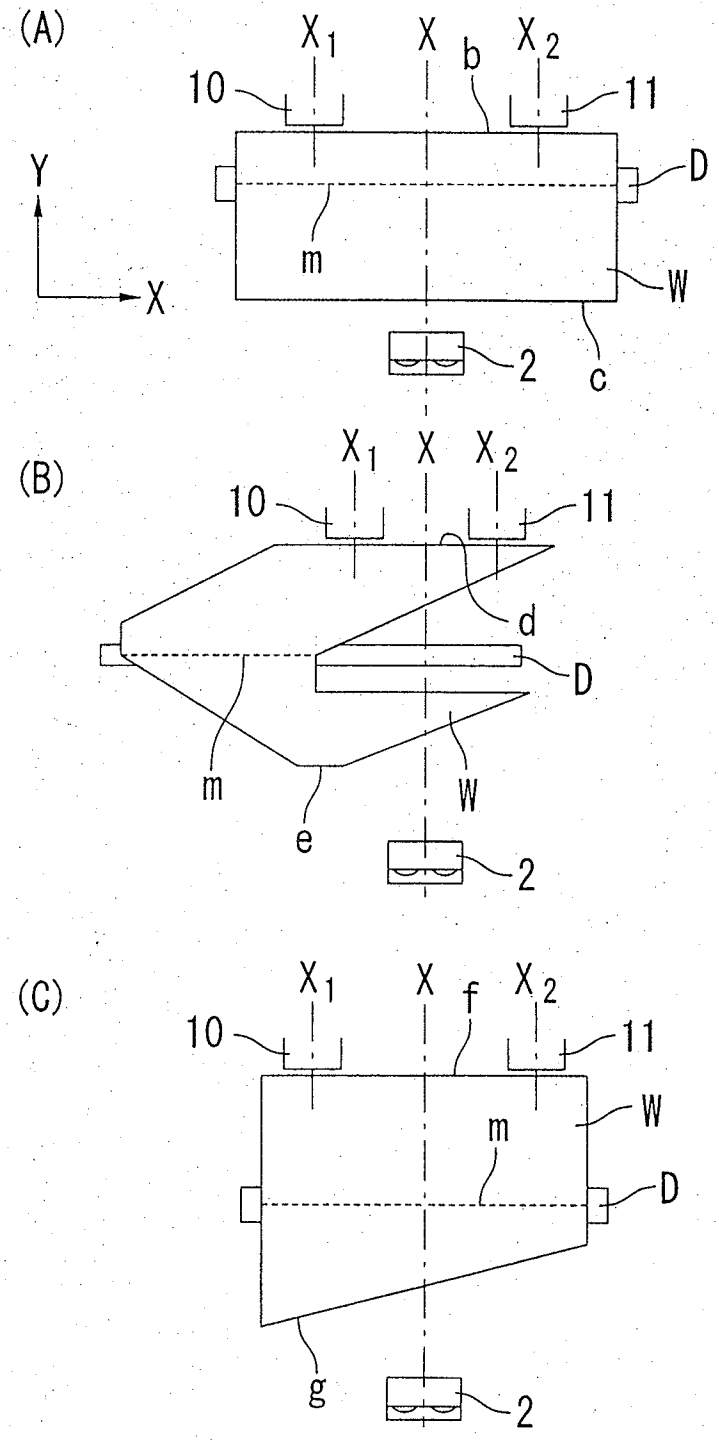
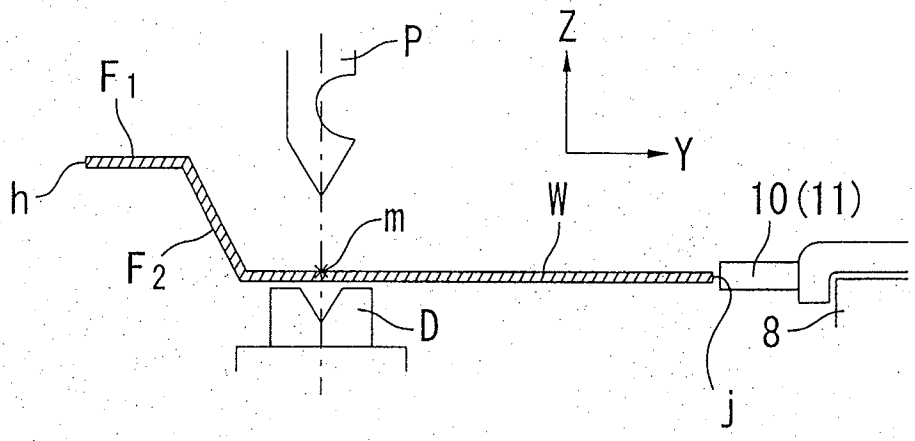

(A)
X1
X
b
X2
10
11
D
Y
X
m
W
2
c
(B)
X1
X
X2
10
11
d
D
m
e
W
2
(C)
X1
X
f
X2
10
11
W
m
D
g
2

FIG.7



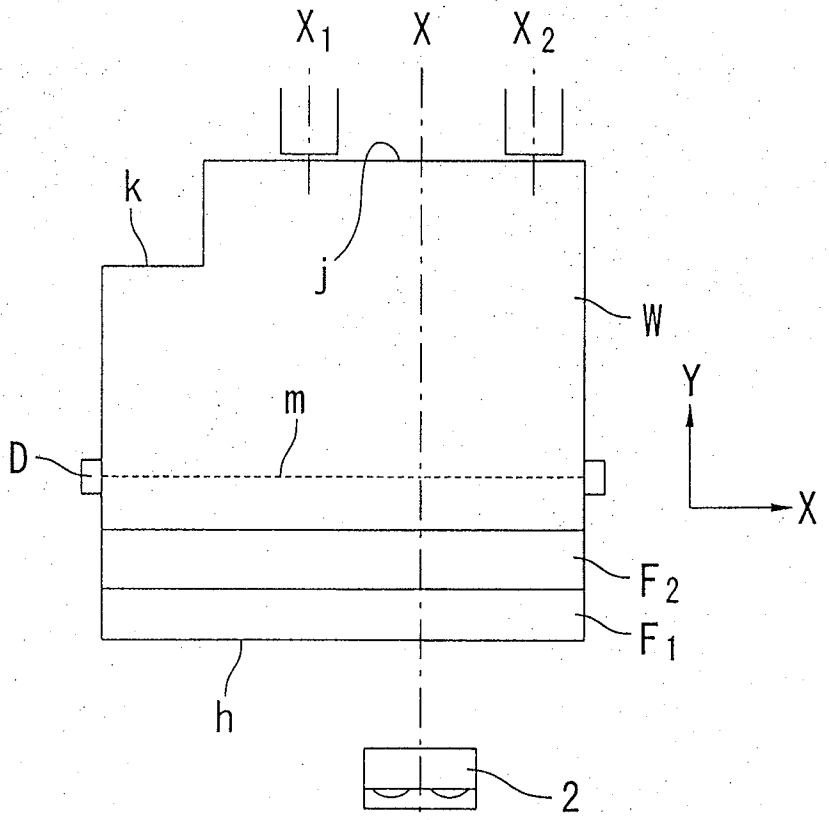


FIG.8

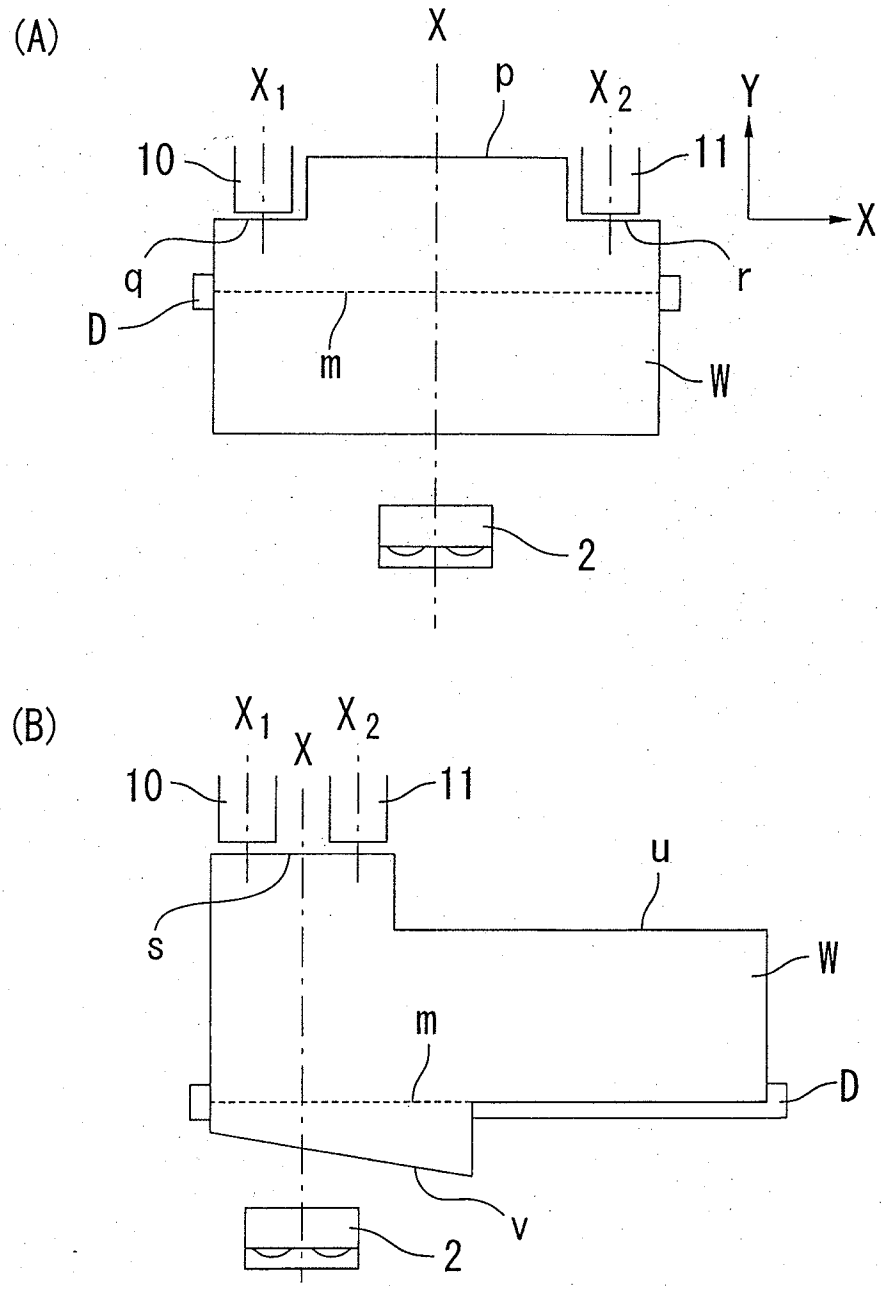


FIG.9

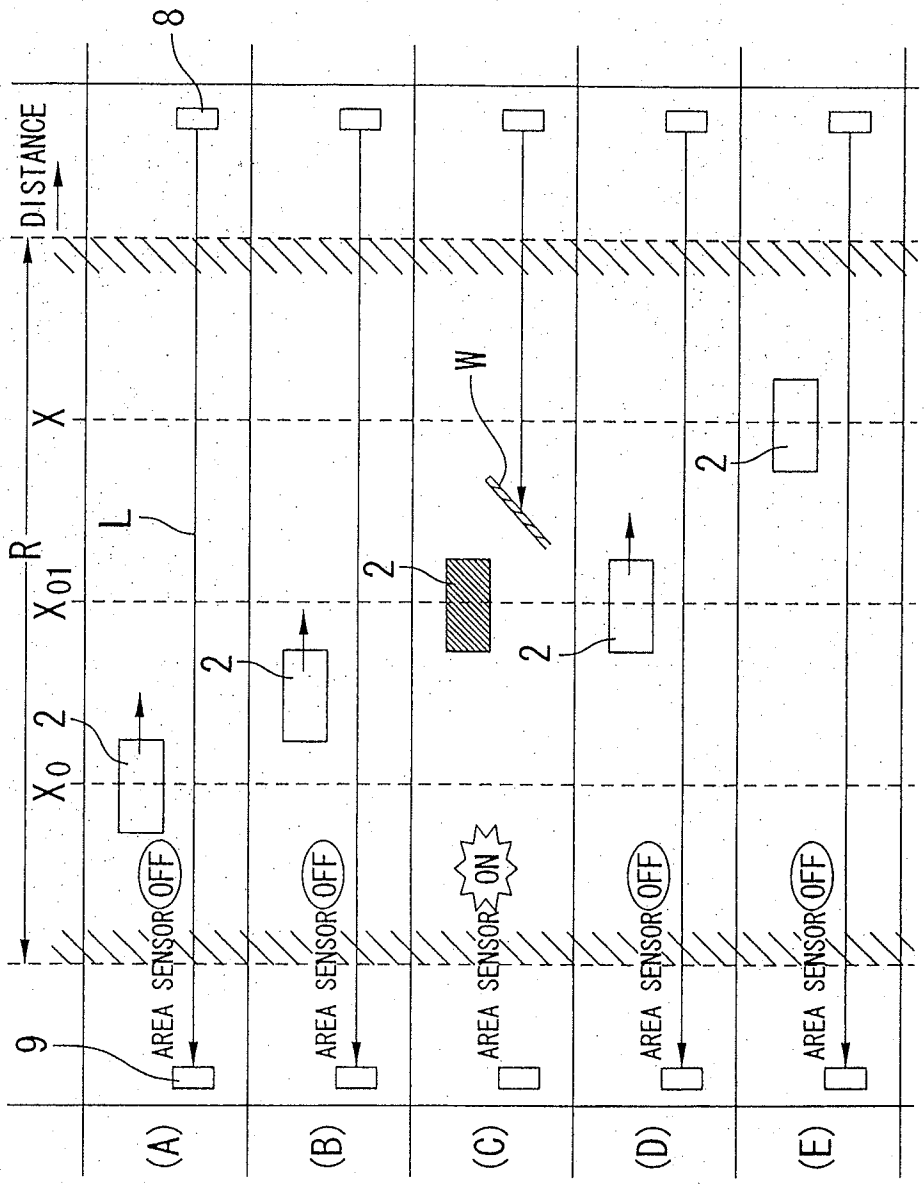


FIG.10

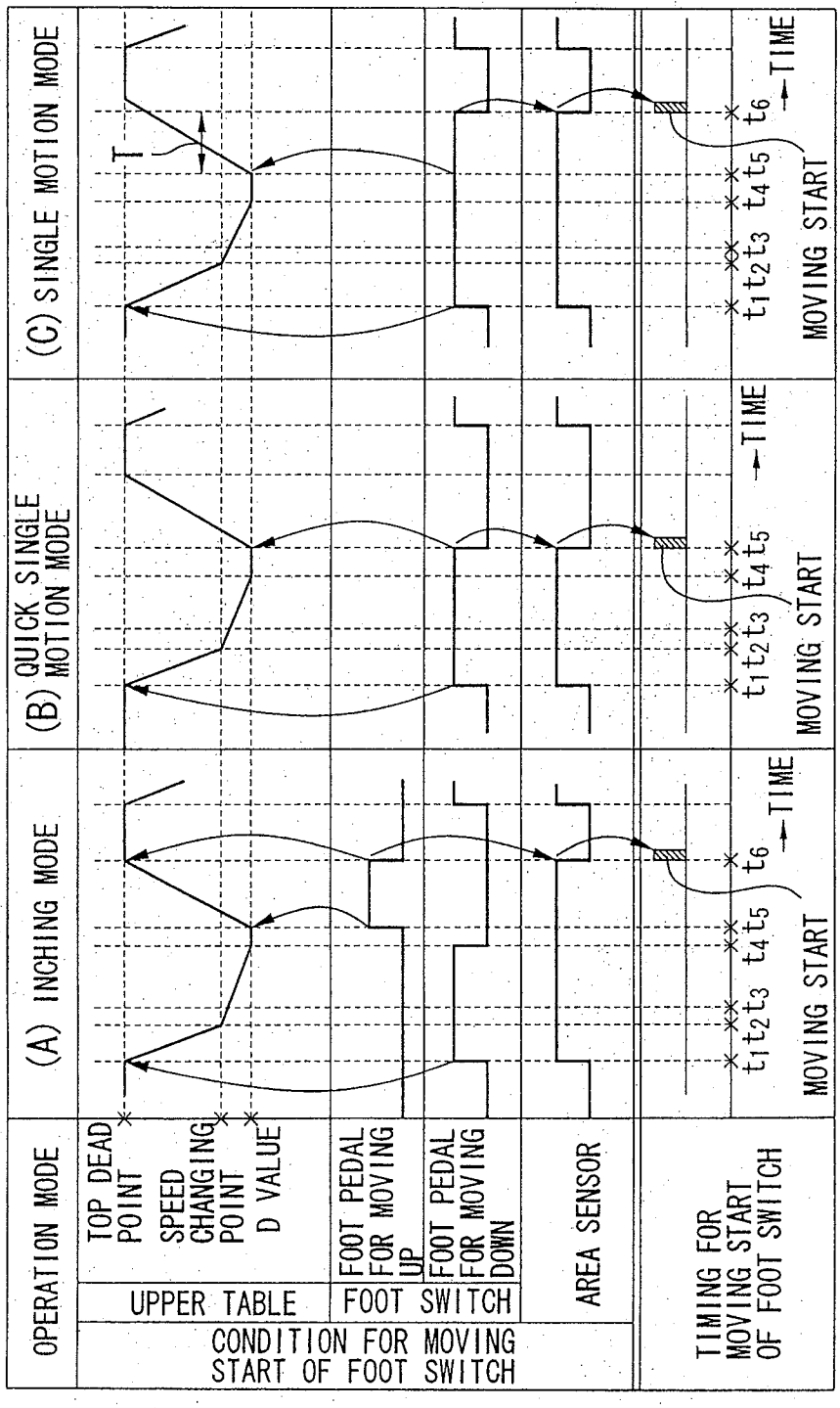

OPERATION MODE
(A) INCHING MODE
(B) QUICK SINGLE MOTION MODE
(C) SINGLE MOTION MODE
TOP DEAD POINT
SPEED CHANGING POINT
D VALUE
T
UPPER TABLE
FOOT PEDAL FOR MOVING UP
FOOT PEDAL FOR MOVING DOWN
FOOT SWITCH
AREA SENSOR
CONDITION FOR MOVING START OF FOOT SWITCH
TIMING FOR MOVING START OF FOOT SWITCH
t1 t2 t3 t4 t5 t6
TIME
MOVING START

FIG.11

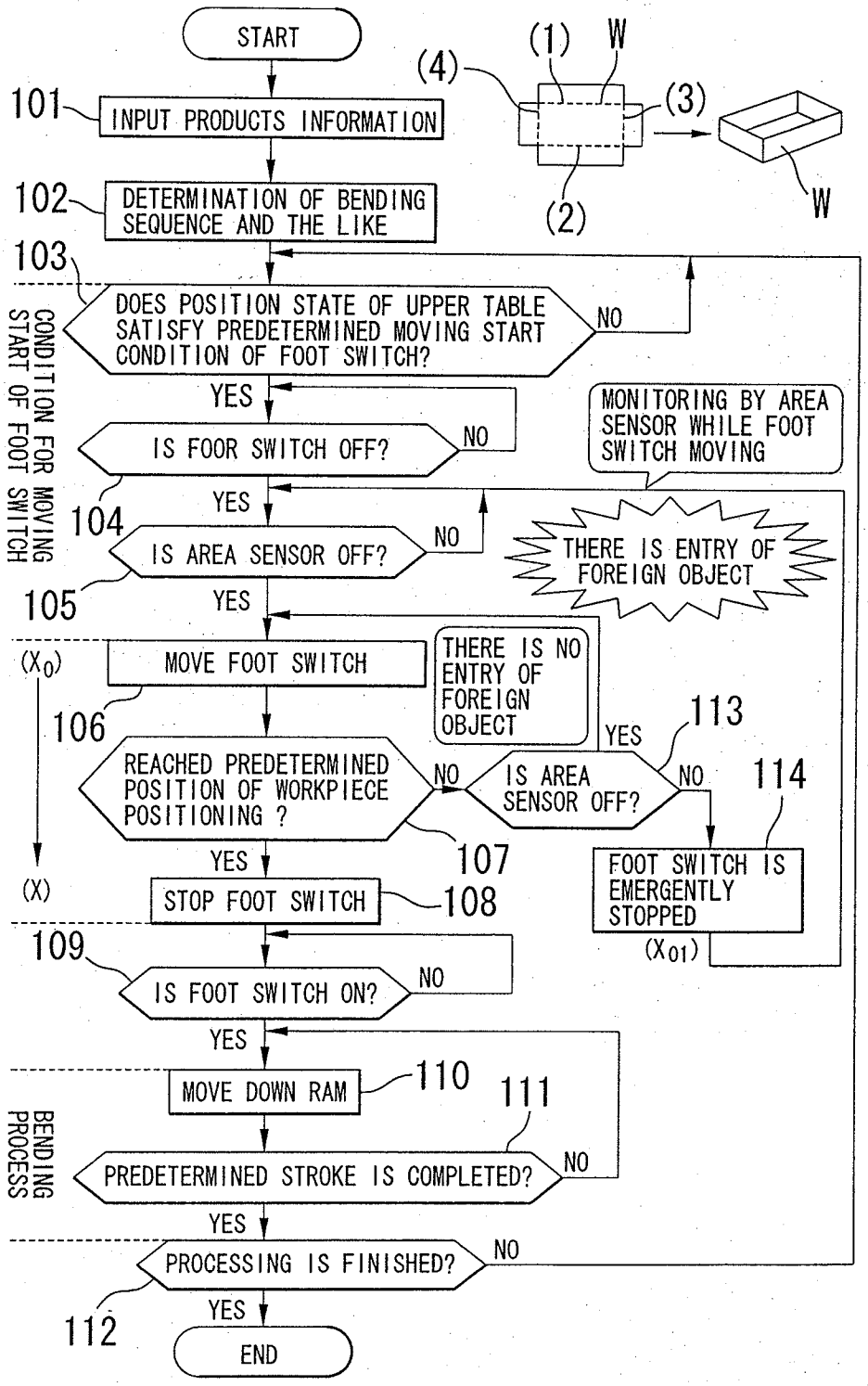

START
101
INPUT PRODUCTS INFORMATION
102
DETERMINATION OF BENDING SEQUENCE AND THE LIKE
103
DOES POSITION STATE OF UPPER TABLE SATISFY PREDETERMINED MOVING START CONDITION OF FOOT SWITCH?
NO
YES
IS FOOR SWITCH OFF?
NO
YES
104
IS AREA SENSOR OFF?
NO
YES
105
CONDITION FOR MOVING START OF FOOT SWITCH
MONITORING BY AREA SENSOR WHILE FOOT SWITCH MOVING
THERE IS ENTRY OF FOREIGN OBJECT
(X0)
MOVE FOOT SWITCH
106
THERE IS NO ENTRY OF FOREIGN OBJECT
YES
113
REACHED PREDETERMINED POSITION OF WORKPIECE POSITIONING ?
NO
IS AREA SENSOR OFF?
NO
114
YES
107
(X)
STOP FOOT SWITCH
108
FOOT SWITCH IS EMERGENTLY STOPPED
(X01)
109
IS FOOT SWITCH ON?
NO
YES
MOVE DOWN RAM
110
111
PREDETERMINED STROKE IS COMPLETED?
NO
YES
BENDING PROCESS
PROCESSING IS FINISHED?
NO
YES
112
END
(1)
W
(4)
(3)
(2)
W

FIG.12

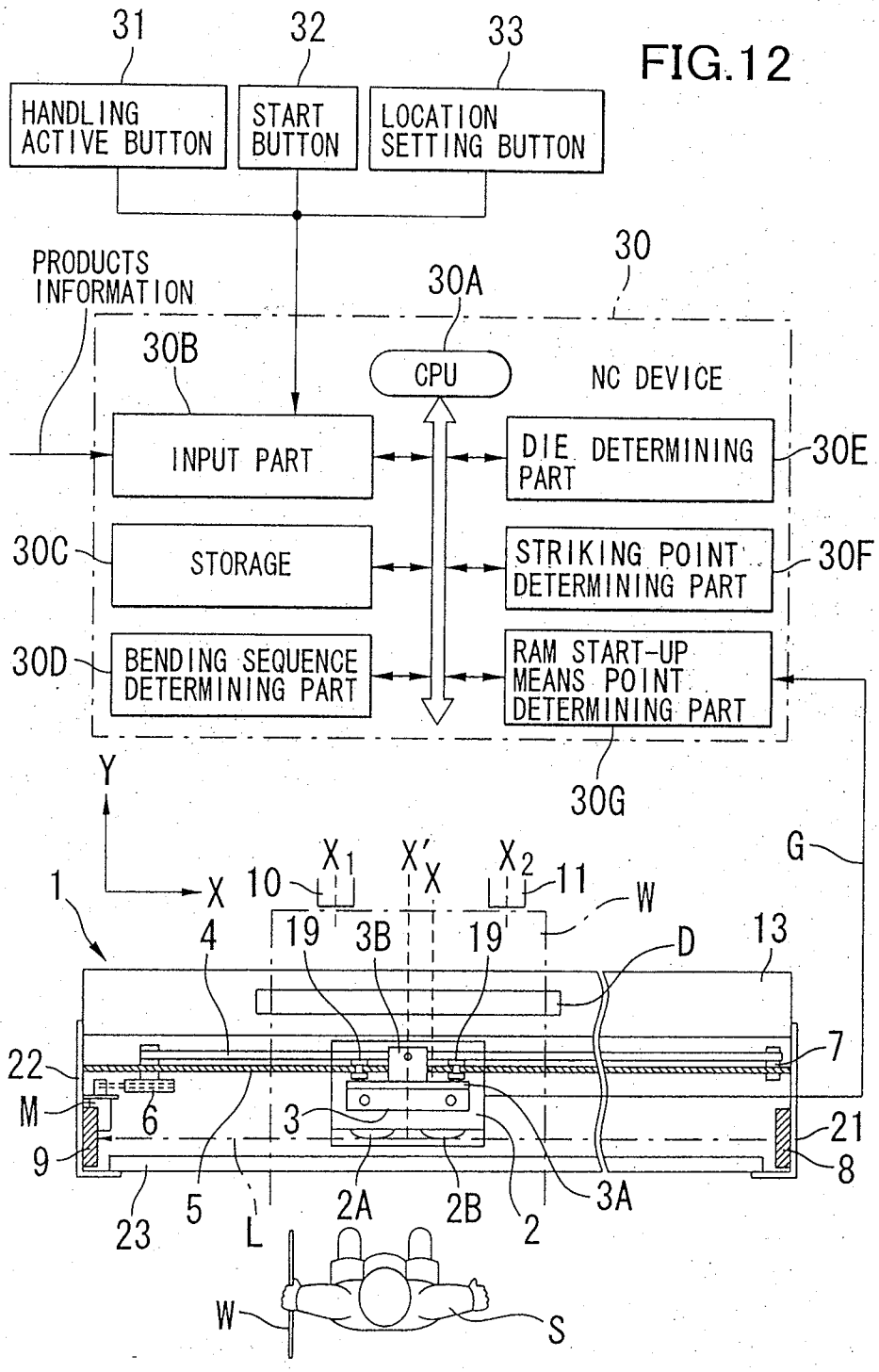

31
32
33
HANDLING ACTIVE BUTTON
START BUTTON
LOCATION SETTING BUTTON
PRODUCTS INFORMATION
30
30A
30B
CPU
NC DEVICE
INPUT PART
DIE DETERMINING PART
30E
30C
STORAGE
STRIKING POINT DETERMINING PART
30F
30D
BENDING SEQUENCE DETERMINING PART
RAM START-UP MEANS POINT DETERMINING PART
30G
Y
X
G
1
10
X1
X'
X
X2
11
W
4
19
3B
19
D
13
22
7
M
6
3
21
9
8
23
5
L
2A
2B
2
3A
W
S

FIG.13

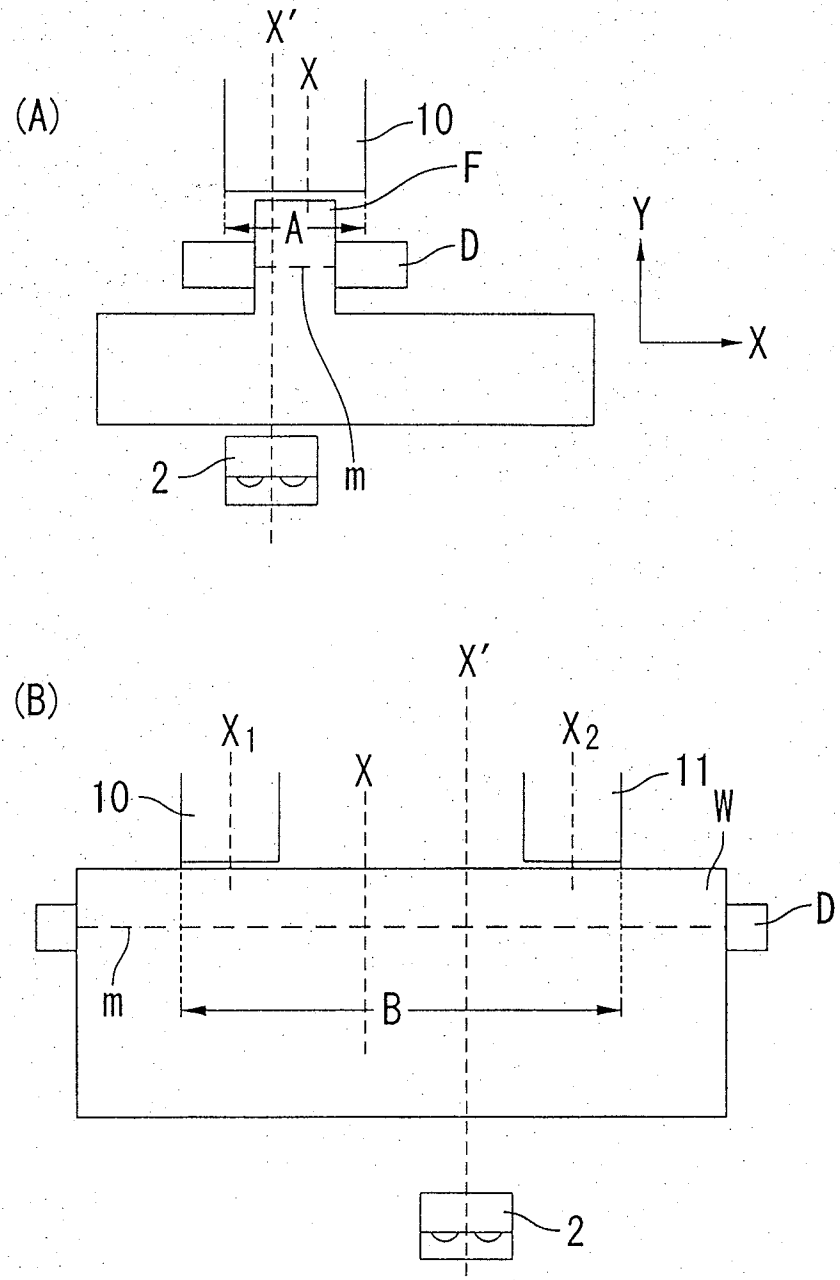


FIG.14

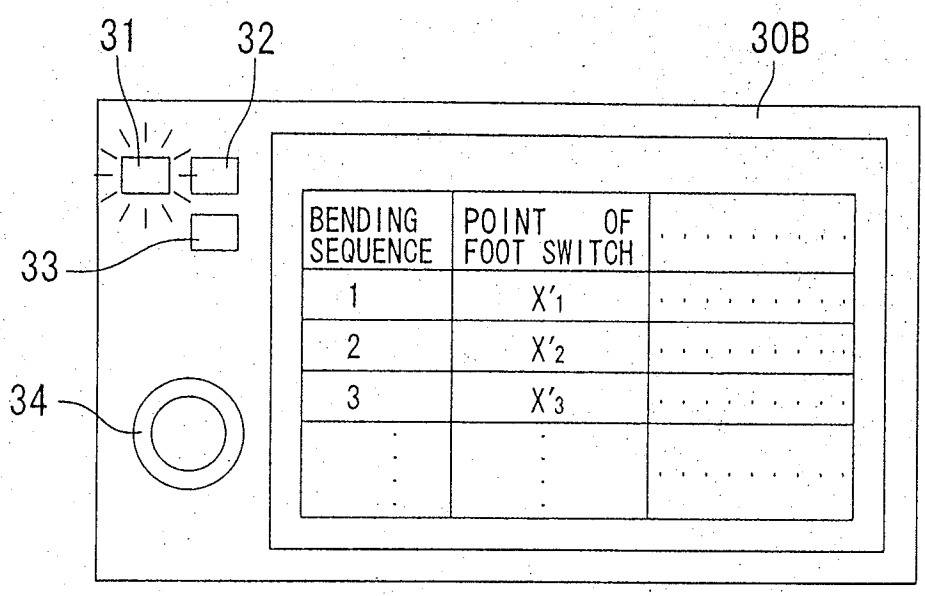

31
32
30B
33
34
BENDING SEQUENCE
POINT OF FOOT SWITCH
1
X'1
2
X'2
3
X'3

FIG.15

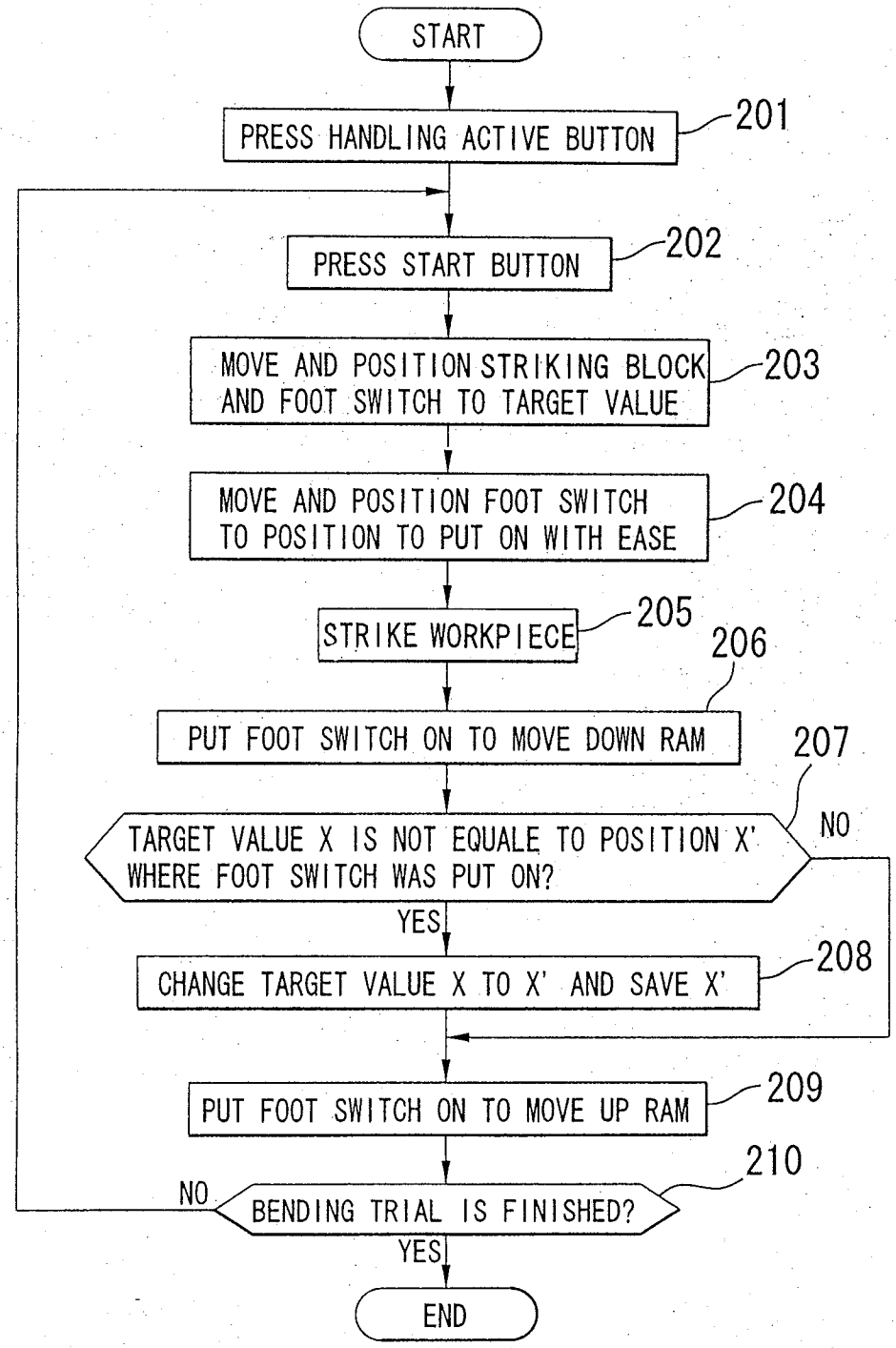

START
PRESS HANDLING ACTIVE BUTTON
201
PRESS START BUTTON
202
MOVE AND POSITION STRIKING BLOCK AND FOOT SWITCH TO TARGET VALUE
203
MOVE AND POSITION FOOT SWITCH TO POSITION TO PUT ON WITH EASE
204
STRIKE WORKPIECE
205
206
PUT FOOT SWITCH ON TO MOVE DOWN RAM
207
TARGET VALUE X IS NOT EQUALE TO POSITION X' WHERE FOOT SWITCH WAS PUT ON?
NO
YES
CHANGE TARGET VALUE X TO X' AND SAVE X'
208
PUT FOOT SWITCH ON TO MOVE UP RAM
209
210
NO
BENDING TRIAL IS FINISHED?
YES
END

FIG.16

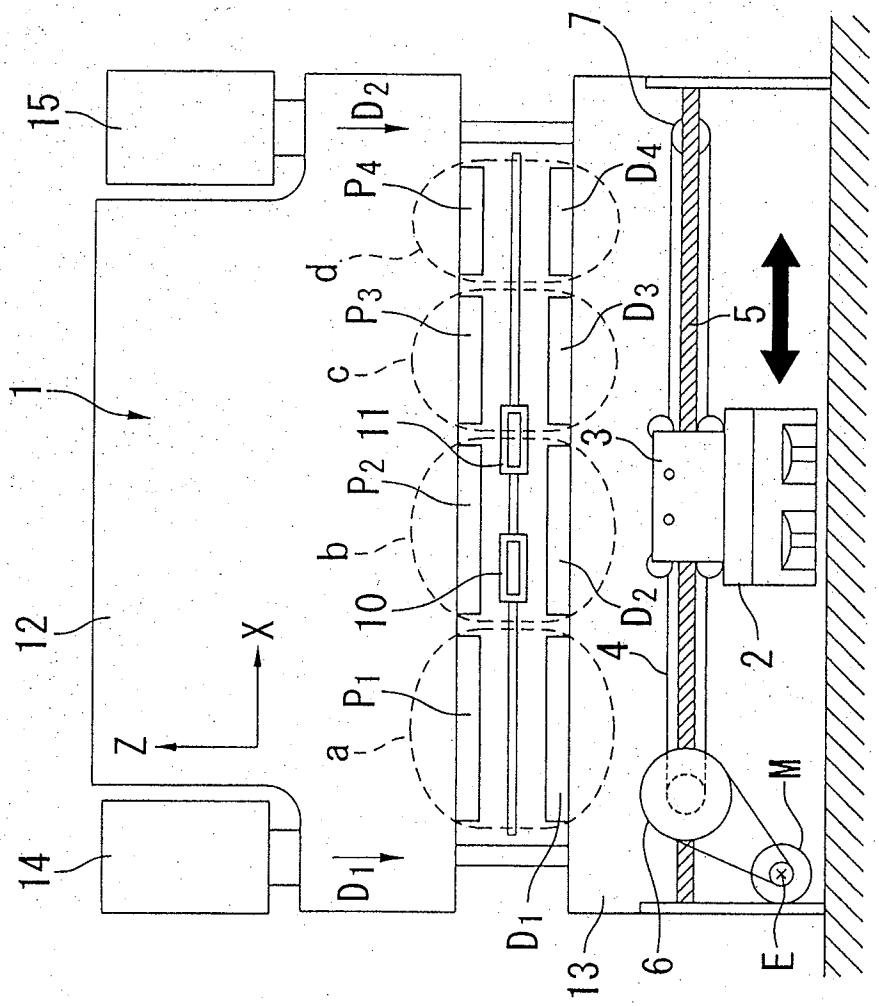


FIG.17

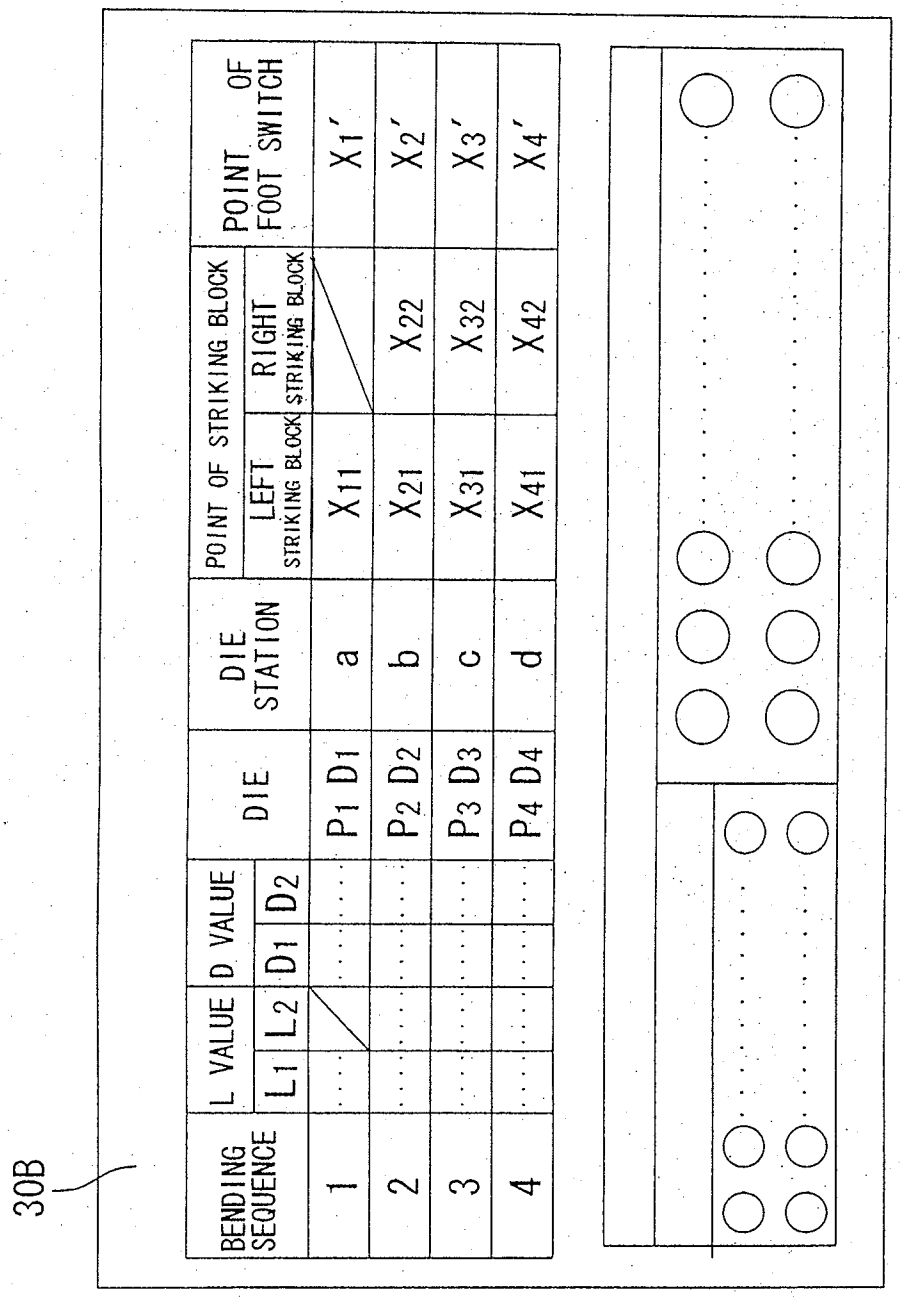
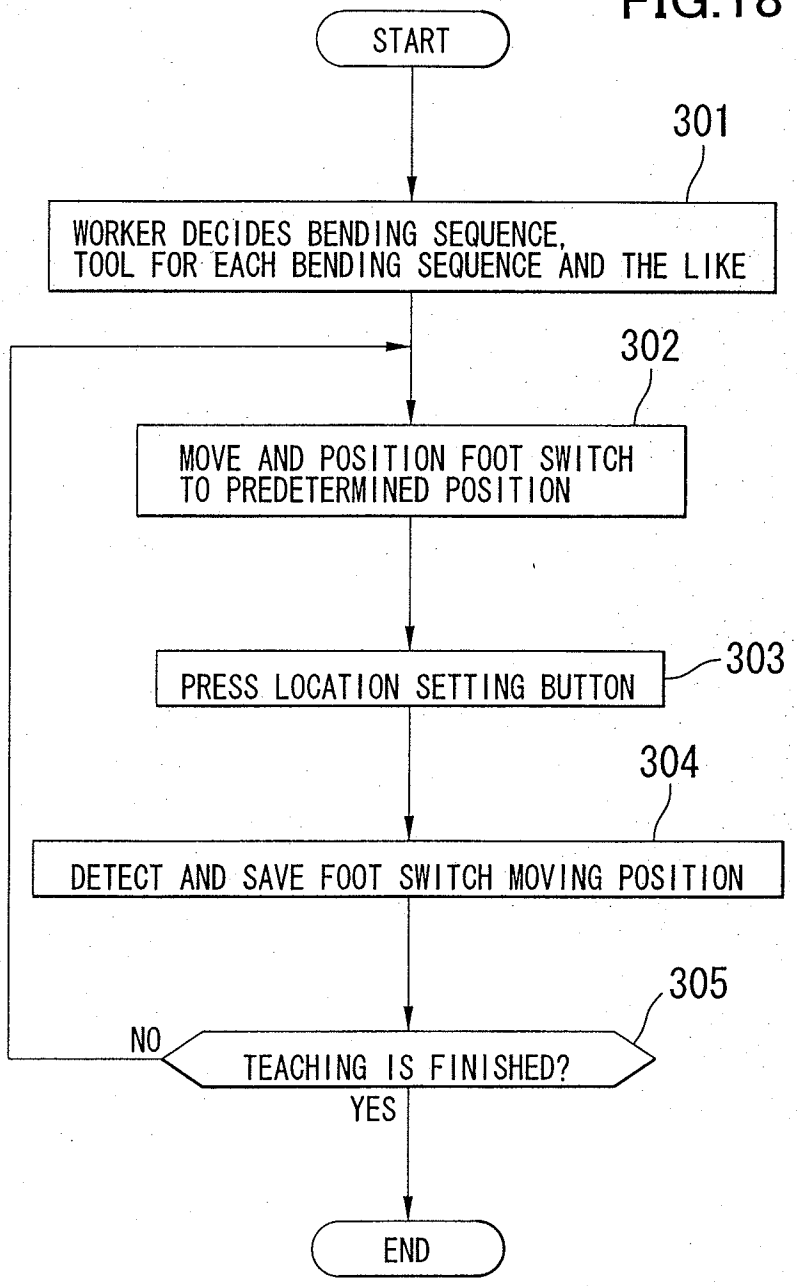

30B
BENDING SEQUENCE
L VALUE
L1
L2
D VALUE
D1
D2
DIE
DIE STATION
POINT OF STRIKING BLOCK
LEFT STRIKING BLOCK
RIGHT STRIKING BLOCK
POINT OF FOOT SWITCH
1
P1 D1
a
X11
X1′
2
P2 D2
b
X21
X22
X2′
3
P3 D3
c
X31
X32
X3′
4
P4 D4
d
X41
X42
X4′

FIG.18


START
301
WORKER DECIDES BENDING SEQUENCE, TOOL FOR EACH BENDING SEQUENCE AND THE LIKE
302
MOVE AND POSITION FOOT SWITCH TO PREDETERMINED POSITION
303
PRESS LOCATION SETTING BUTTON
304
DETECT AND SAVE FOOT SWITCH MOVING POSITION
305
NO
TEACHING IS FINISHED?
YES
END